

Appl. No. 10/666,493
Reply to Final Office Action of February 13, 2006

AMENDMENTS TO THE CLAIMS

Claims 1, 3-9 and 11-15 are pending in the present application. Claims 1, 4, 7, 9, 12 and 14 have been amended as set forth below. This listing and version of the claims replace all prior listings and versions of the claims.

Listing of Claims:

1. (Currently amended) A method to form a floating gate for a flash memory device, said method comprising:
 - forming a dielectric layer over a substrate;
 - removing a portion of said dielectric layer to define an area where said floating gate is to be formed;
 - forming a floating gate dielectric layer overlying said ~~dielectric layer~~ and said area where said floating gate is to be formed, wherein ~~the gate dielectric layer overlying a remaining portion of~~ said dielectric layer serves as a control gate dielectric layer and said floating gate dielectric layer overlying said area where said floating gate is to be formed serves as a tunneling layer;
 - forming a conductor layer overlying said floating gate dielectric layer, thereby forming said floating gate;
 - forming a masking layer overlying said conductor layer;
 - forming conductive spacers on the sidewalls of said conductor layer and said masking layer, and over a portion of said dielectric layer, wherein said spacers extend vertically above the top surface of said conductor layer; and
 - removing said masking layer.
2. (Canceled)
3. (Previously amended) The method according to Claim 1 wherein said dielectric layer is formed by thermal oxidation of said substrate.
4. (Currently amended) The method according to Claim 3 wherein said floating gate dielectric layer is formed by thermal oxidation of said substrate.

Appl. No. 10/666,493

Reply to Final Office Action of February 13, 2006

5. (Previously presented) The method according to Claim 1 wherein said conductor layer and said conductive spacers comprise polysilicon.
6. (Previously presented) The method according to Claim 1 further comprising the steps of:
forming another dielectric layer overlying said floating gate and said substrate;
forming another conductor layer overlying said another dielectric layer; and
patterning said another conductor layer to form a control gate overlying said floating gate.
7. (Currently amended) The method according to Claim 6 wherein part of said control gate overlies said control gate dielectric layer ~~substrate but not said floating gate~~.
8. (Original) The method according to Claim 7 further comprising implanting ions into said substrate to form doped regions adjacent to said control gate and to said floating gate.
9. (Currently amended) A method to form a flash memory device, said method comprising:
forming a first dielectric layer over a substrate;
removing a portion of said first dielectric layer to define an area where a floating gate is to be formed;
forming a floating gate dielectric layer overlying ~~said first dielectric layer and said area~~ where said floating gate is to be formed, wherein ~~the gate dielectric layer overlying a remaining portion of said first dielectric layer serves as a control gate dielectric layer~~, and said ~~first~~ floating gate dielectric layer overlying said area where said floating gate is to be formed serves as a tunneling layer;
forming a first conductor layer overlying said floating gate dielectric layer;
forming a masking layer overlying said first conductor layer;
patterning said masking layer and said first conductor layer, thereby forming said floating gate;
thereafter forming a second conductor layer overlying said masking layer, said first conductor layer, and said substrate;

Appl. No. 10/666,493

Reply to Final Office Action of February 13, 2006

patterning said second conductor layer to form spacers on said sidewalls of said first conductor layer and said masking layer, and over a portion of said dielectric layer, wherein said spacers extend vertically above the top surface of said first conductor layer;

removing said masking layer;

forming a second dielectric layer overlying said floating gate and said substrate;

forming a third conductor layer overlying said second dielectric layer; and

patterning said third conductor layer to form a control gate overlying said floating gate.

10. (Canceled)

11. (Original) The method according to Claim 9 wherein said first dielectric layer is formed by thermal oxidation of said substrate.

12. (Currently amended) The method according to Claim 11 wherein said floating gate dielectric layer is formed by thermal oxidation of said substrate.

13. (Original) The method according to Claim 9 wherein said first and second conductor layers comprise polysilicon.

14. (Currently amended) The method according to Claim 9 wherein part of said control gate overlies said control gate dielectric layer~~substrate but not said floating gate~~.

15. (Original) The method according to Claim 14 further comprising implanting ions into said substrate to form doped regions adjacent to said control gate and to said floating gate.

16. (Withdrawn) A flash memory device comprising:

a substrate;

a floating gate overlying said substrate wherein said floating gate comprises:

a conductor layer overlying a dielectric layer; and

conductive spacers adjacent to and contacting said first conductor layer wherein said spacers extend vertically above said conductor layer; and

Appl. No. 10/666,493

Reply to Final Office Action of February 13, 2006

a control gate overlying said floating gate with a second dielectric therebetween.

17. (Withdrawn) The device according to Claim 16 wherein said gate dielectric layer underlying said floating gate comprises a first thickness underlying said first conductor layer and a second thickness underlying said spacers.

18. (Withdrawn) The device according to Claim 16 wherein said first and second conductor layers comprise polysilicon.

19. (Withdrawn) The device according to Claim 16 wherein part of said control gate overlies said substrate but not said floating gate.

20. (Withdrawn) The device according to Claim 19 further comprising doped regions adjacent to said control gate and to said floating gate.